

Safe Working Practices for SNL/NM Center 1100

Part A: PHS Information

PHS Identification

PHS-SNL06A00922-005 CINT Rms: 1522 & 1523 - Lithography Bay and Chase

Hazard Classification: LOW

NEPA SNA07-0202 - CINT Integration Laboratories (1501, 1504, 1523, 1525, and 1527)

This completed SWP meets the requirements of a Job Safety Assessment as specified by the Work Planning and Controls manual.

Laboratory Owner

John Nogan, 1132, 284-8863

Brief Description of R&D Work Performed in this Laboratory

Room 1522 and 1523 are designated the lithography room and chase, respectively. Chase 1522's function is to provide space for the return air from lithography room 1523, and to house the gas lines, electrical outlets, vacuum pumps, and exhaust handling system. No laboratory experiments will be performed in this area. However, the area will be used for routine maintenance of the equipment in 1523 and to provide storage for lab user PPE (Personal Protective Equipment). Room 1523 will be used for the process and associated metrology of contact mask lithography. This includes processing of industry standard photoresist, which typically requires spinning the photoresist on a wafer followed by exposing using a UV (260nm/365nm) contact mask aligner and baking at up to 250C on a hot plate or in an oven. The photoresist is then typically developed using a base such as KOH (Potassium Hydroxide) or TMAH (Tetramethylammonium Hydroxide) and can be removed using a common solvent. An O₂ (oxygen) plasma or atmospheric O₃ (ozone) surface clean typically follows the develop step to remove residual photoresist. Metrology equipment used in this process includes an optical microscope for visual inspection.

Part B: Operations Identification, Hazards and Mitigation

Short Title of Laboratory Operations Category: Chemical Usage

Rigor Level: Low

Description of Laboratory-Specific Operations that Involves Chemical Hazards:

Acids: None.

Bases: Tetramethylammonium Hydroxide and Potassium Hydroxide.

Oxidizers: Hydrogen Peroxide, O₃ (Ozone)

Solvents: Small amounts of organic solvents such as isopropanol, methanol, ethanol, acetone, positive and negative photoresist, PGMEA (propylene glycol monomethyl ether acetate), toluene, and NMP (N-methylpyrrolidone) are commonly used.

Various developers are also used in laboratory operations. Bases are used to develop the photoresist after exposure on the mask aligner. The base bench is a locally ventilated hood; the potential for exposure to chemical vapors is low based on the small quantities used and the use of local exhaust ventilation.

The solvent bench is a locally ventilated hood with a solvent collection system. Air discharges are small and consistent with typical R&D operations. The potential for exposure to solvent vapors is low based on the small quantities used and the use of local exhaust ventilation.

The UV Ozone cleaning system generates a quantity of low level ozone through the exposure of room air to ultraviolet light in a controlled chamber. Risk of exposure to ozone is mitigated through the use of interlocks and local exhaust ventilation.

Baseline Occupational Exposure Assessments were completed and are listed below:

ER2007-2646 - Baseline OEA (518/1522/1523) CINT Rm: 1522 & 1523 - Lithography Bay and Chase

Conclusions stated that exposure controls are adequate for laboratory operations.

All activities that involve chemicals will follow the laboratory practices outlined in SNL/NM Center SOP1100.00 Standard Operating Procedure for Working with Hazardous and Particularly Hazardous Chemicals in Center 1100 Laboratories.

Applicable Technical Work Documents:

- SOP1100.001 Standard Operating Procedure for Working with Hazardous and Particularly Hazardous Chemicals in SNL/NM Center 1100 Laboratories

These documents are required reading for all authorized workers.

Required Training:

- ESH100 ES&H Awareness
- CHM100 Chemical Safety Training
- CHM103 Site-Specific Chemical Safety Training
- ENV112 Hazardous Waste and Environmental Management
- ILUA Integrated Lab Unescorted Assess Training

These courses are required training for all authorized workers.

Short Title of Laboratory Operations Category: Environmental Rigor Level: Low	
Description of Laboratory Operations Category: Solid as well as liquid hazardous waste is generated during operation processes.	
Applicable Technical Work Documents: <ul style="list-style-type: none"> SOP1100.001 Standard Operating Procedure for Working with Hazardous and Particularly Hazardous Chemicals in SNL/NM Center 1100 Laboratories <p>These documents are required reading for all authorized workers.</p>	Required Training: <ul style="list-style-type: none"> CHM100 Chemical Safety Training CHM103 Site-Specific Chemical Safety Training ENV112 Hazardous Waste and Environmental Management. ILUA Integrated Lab Unescorted Assess Training <p>These courses are required training for all authorized workers.</p>
Resulting Hazards: <ul style="list-style-type: none"> Bodily injury Environmental Concern 	Mitigation of Identified Hazards: Solvent contaminated wipes, swabs, and gloves will be disposed of in the trash receptacles marked Solvent. Dried wipes of evaporated acetone, isopropanol, or methanol may be disposed of in the non-hazardous trash.

Short Title of Laboratory Operations Category: Thermal hazards Rigor Level: Low	
Description of Laboratory Operations Category: Hot plates are used as part of operations in this area.	
Applicable Technical Work Documents: <ul style="list-style-type: none"> N/A <p>These documents are required reading for all authorized workers.</p>	Required Training: <ul style="list-style-type: none"> ESH100 ES&H Awareness ILUA Integrated Lab Unescorted Assess Training <p>These courses are required training for all authorized workers.</p>
Resulting Hazards: <ul style="list-style-type: none"> Thermal burns 	Mitigation of Identified Hazards: Lab personnel read the manufacturer's manual prior to use and have on the job training prior to use of this equipment.

Short Title of Laboratory Operations Category: Mechanical hazards Rigor Level: Low	
Description of Laboratory Operations Category: Portable power tools, 0-10,000 rpm resist spinners .	
Applicable Technical Work Documents: <ul style="list-style-type: none"> • N/A 	Required Training: <ul style="list-style-type: none"> • ESH100 ES&H Awareness • ILUA Integrated Lab Unescorted Assess Training
These documents are required reading for all authorized workers.	These courses are required training for all authorized workers.
Resulting Hazards: <ul style="list-style-type: none"> • Hand injury • Electrical 	Mitigation of Identified Hazards: On-the-Job training is conducted if necessary by personnel.

Short Title of Laboratory Operations Category: Non-ionizing radiation Rigor Level: Low	
Description of Laboratory Operations Category: After the photoresist is applied and baked, the wafers are exposed in the UV mask aligner (deep-UV 265 and near-UV365-400 nm, up to 500 watts).	
Applicable Technical Work Documents: <ul style="list-style-type: none"> • Equipment manuals. 	Required Training: <ul style="list-style-type: none"> • On-the-job training is given to those utilizing the UV lamps prior to use. • ILUA Integrated Lab Unescorted Assess Training
These documents are required reading for all authorized workers.	These courses are required training for all authorized workers.
Resulting Hazards: <ul style="list-style-type: none"> • UV exposure 	Mitigation of Identified Hazards: <ul style="list-style-type: none"> • The UV Mask Aligner is shielded to prevent exposure to UV light. • The potential for exposure to hazardous levels of UV light is low.

Continuous Improvement and Feedback

This SWP document must be reviewed, revised (if necessary), and re-signed at least annually in conjunction with PHS renewal. This SWP must be revised earlier in response to:

- new hazards (e.g. chemicals) being introduced in to the laboratory,
- recognition of hazards not previously considered, or
- identification of significant improvements to hazard control/mitigation defined in this document,

and other situations where improvement to laboratory safety should be documented. It should be noted that these same conditions may require revision of the laboratory PHS and required training matrix.

Reviews and Approval

Prepared by Laboratory Owner			
<u>John Nogan</u>			
Printed Name	Signature	Date	
Reviewed by CINT ES&H Coordinator			
<u>Michael Starr</u>			
Printed Name	Signature	Date	
Additional SME Review required by Center ES&H Coordinator or Department Manager			
Reviewer	Title/Activity	Signature	Date
Additional SME Review required by Center ES&H Coordinator or Department Manager			
Reviewer	Title/Activity	Signature	Date
Approved by Department Manager			
By approving the SWP, the Department Manager attests that it is an appropriate assessment of the ES&H risks associated with the R&D activities that are authorized to take place in the designated lab(s). The approval signature further indicates that the hazard mitigations specified in this SWP are also appropriate.			
<u>Sean Hearne</u>			
Printed Name	Signature	Date	

Laboratory Authorization Sheet:

Signature by the Authorized Workers in the following Summary Authorization Table certify that the worker has read, understood, and agree to follow the Safe Working Practices identified in this document. Authorized Workers agree that they will not introduce hazards into this laboratory that are not covered by the PHS, SWP, and related documents.”

If a new MOW is brought in to work in the laboratory, their training must be evaluated by the Manager or Lab Owner prior to any work being assigned or conducted. Their signature asserts that this has been done.

Printed Name	Signature	Date	Lab Owner Confirm. (initials)	Chemical Operations	Environmental	Thermal Hazards	Mechanical Hazards	Non-ionizing Radiation (UV)							
<i>Rigor Level</i>				<i>L</i>	<i>L</i>	<i>L</i>									

SWP# 1132-1522
Issue # B